

## SCROPHULARIACEAE IN NICARAGUA

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In identifying specimens of Scrophulariaceae from Nicaragua, I was confronted by obscure characters. Sometimes it was impossible to tell whether the upper lip of the corolla covered the lower lip or whether the lower lip covered the upper; or how many stamens there were or whether the anther cells were parallel or divergent. Sometimes the specimen in question was fruiting and corollas were not present. Or, if corollas were only 4-5 mm long as in Stemodia verticillata, the stamens were most difficult to observe. Even when a good corolla was present, I hesitated to destroy by dissection the only corolla.

Obsessed by the suspicion that something can be done by way of identifying Scrophulariaceae even when corollas are not present, and without the help of obscure characters, I developed the following key with the hope that it will be useful to some others.

The distinction between a synopsis and a key needs to be maintained. A synopsis gives the fundamental characters on which members of a taxon are classified. A key, on the other hand, is a device for identifying unknown specimens. It is needed by those who do not know the family well and should be adapted to that purpose.

As species not yet known in Nicaragua may at any time be found there, all species known to occur in Central America are included in this article.

Scrophulariaceae are distinguished from other families mainly by the following characters. Usually herbs but sometimes shrubs or even trees. Flowers usually axillary but sometimes seemingly terminal. Leaves without stipules, either opposite or alternate, or both on the same stem, almost always simple. Calyx shallowly or deeply 4-5-lobed or of seemingly distinct sepals. Corolla 4-5-lobed or of almost distinct petals, from

long-tubular to united merely at base, from almost regular to very irregular. Stamens inserted on the corolla, 2 or 4; sterile rudiments often present. Pistil 1. Ovary usually 2-locular, usually many-seeded.

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An artificial key to genera of Scrophulariaceae in Central America for fruiting specimens. As this key can be used for flowering specimens also, some flowering characters are given.

- A. Leaves all basal or nearly so; stem, if any, almost or quite leafless B.  
B. Leaves long, linear, like petioles, or widened near tip; stem creeping, p. 21 Limosella acaulis Sesse & Mocino  
B. Leaves wider, various, 2-8 cm wide, p. 17 . Tetranema  
A. Leaves, some of them, borne on stem well above base C.  
C. Upper leaves alternate or clustered (fasciculate) D.  
 cp. p. 4  
D. Lower leaves opposite E.  
E. Bracts of inflorescence large, leaf-like, often brightly colored, about as long as or longer than corolla; calyx 9-25 mm long, p. 35 . . . Castilleja  
E. Bracts of inflorescence small or none, not leaf-like, not colored F.  
F. Leaves narrowly linear to filiform; flowers solitary in axils of upper leaves or bracts; calyx tubular; plant black when dry, hispid or scabrous, p. 33 . . . . . Buchnera  
F. Leaves lanceolate or wider G.  
G. Petioles and pedicels twining; blades triangular, 3-5-lobed; pedicels axillary 2-10 cm long, p. 10 . . . . . Maurandya  
G. Petioles and pedicels not twining; flowers in terminal racemes H.

H. Calyx lobed 1/2 way, lobes about equaling tube; lower blades spatulate, rounded at tip, bluntly toothed; stem 4-12 cm tall; flowers in racemes without bracts or leaves, p. 19 . . . . . Mazus japonicus (Thunb.) Kuntze

H. Calyx lobed nearly or quite to base I.

I. Capsule compressed, notched, often wider than long; corolla with 4 spreading lobes, tube very short, p. 30 . . . . . Veronica

I. Capsule ovoid or oblong, not compressed; flowers (at least lower ones) in axils of reduced leaves or bracts J.

J. Calyx-lobes oval or ovate, obtuse, very hairy, 4-6 mm long; corolla 4 cm long, p. 10 . . . . . Snapdragon, Antirrhinum majus L.

J. Calyx-lobes narrow, acute K.

K. Calyx up to 3 cm long, puberulent; corolla 6-8 cm long; pedicels up to 6 cm long, p. 8 . . . . . Eremogeton grandiflorus (Gray) Standley & L. Wms.

K. Calyx 3.5-4 mm long, glabrous; corolla 1-2 cm long; stem 4-angled; pedicels 8-20 mm long L.

L. Leaves on petioles, serrate; plant glabrous or nearly so, p. 8 . . . . . Alonsoa meridionalis (L. f.) Kuntze

L. Leaves sessile or subsessile, serrulate or subentire, glabrous or hairy, p. 8 Angelonia

D. Lower and other leaves alternate M. cp. p. 2

M. Bracts of inflorescence as long or longer than corolla, red (usually) or orange or green; calyx 9-25 mm long; inflorescence terminal, spike-like, p. 35 . . . . . Castilleja

M. Bracts or leaves of inflorescence green, large or small N.

N. Stem prostrate; blades orbicular-kidney-shaped, toothed or lobed, p. 28 . . . . . Sibthorpia repens (L.) Kuntze

N. Stem erect or ascending O.

O. Calyx longer than pedicels P.

P. Leaves pinnately divided; calyx-lobes shorter than tube, p. 37 . . . . . Pedicularis orizabae C. & S.

P. Leaves entire or toothed; calyx lobed almost to base Q.

Q. Inflorescence 1-sided; flowers turned downward; leaves dentate or almost entire, p. 31 . . . . . Foxglove, Digitalis purpurea L.

Q. Inflorescence not 1-sided; flowers ascending; leaves entire, p. 10 . . . . . Snapdragon, Antirrhinum majus L.

O. Calyx shorter than pedicels; subtending leaves longer than pedicels R.

R. Capsule about 4-6 mm long, abruptly tipped, notched; corolla about 1 cm long 28. Capraria biflora L.

R. Capsule 2-3 cm long, tapering; corolla 6-8 cm long p.8. Eremogeton grandiflorus (Gray) Standley &

L. Wms.

C. Upper leaves opposite or more than 2 at a node S. cp. p. 2

S. Plant a shrub or small tree; corolla tubular, equaling or much longer than calyx T. cp. p. 5

T. Blades entire; calyx-tube cup-shaped U.

U. Fruit dry (capsule); stamens 2 or 4; staminodes sometimes 2; calyx-lobes 4, linear, slightly longer than tube; flowers terminal, in racemes or spikes, p. 37 . . . . . Lamourouxia longiflora Bth.

U. Fruit fleshy (berry); fertile stamens 4; staminode present; calyx shallowly lobed; flowers axillary V.

V. Pairs of leaves unequal; calyx 5-toothed; corolla tubular, not 2-lipped, lobes small, nearly equal, p. 28 . . . . . Gibsoniothamnus

V. Pairs of leaves equal; calyx 3-4-toothed; corolla cup-shaped, 2-lipped, lobes large, unequal, p. 11 . . . . . Schlegelia

T. Blades dentate; stamens 4; fruit dry (capsule) W.

W. Calyx deeply 4-lobed (in Central America); staminode present X.

X. Flowers dense, many; pedicels 1-2 mm long; petioles up to 8 cm long; blades very hairy above and beneath, p. 18 Uroskinnera spectabilis Lindley

X. Flowers in axils of upper leaves or bracts; pedicels 2-10 mm long; petioles none or short; blades hairy or glabrous, p. 37 . . . . . Lamourouxia

W. Calyx 5-lobed or -toothed Y.

Y. Calyx shallowly toothed; leaves viscid-villous, almost sessile; stamens 4, all fertile, p. 18 . . . . . Hemichaena fruticosa Bth.

Y. Calyx lobed nearly to base Z.

Z. Leaves glabrous or sparsely hairy; pedicels up to 2 cm long; petioles up to 1 cm long; sepals up to 12 mm long; corolla 9-16 mm long, p. 20 . . . . . Stemodia fruticosa Lundell

Z. Leaves densely hairy above and beneath; pedicels as much as 6 cm long; petioles short; sepals up to 3 cm long; corolla 6-8 cm long, p. 8 . . . Eremogeton grandiflorus (Gray) Standley &

L. Wms.



S. Plant an herb Aa. cp. p. 4

Aa. Blades lobed or divided; plants glabrous; anthers 4 Ab.

Ab. Lobes of blade lanceolate or wider; petioles long Ac.

Ac. Flowers in cymes; lobes of blades acute; blades pinately nerved, p. 9 . . . . . CalceolariaAc. Flowers (in ours) solitary in axil of leaves; blades palmately nerved; lobes of blades obtuse; stem prostrate, p. 9 . . . . . Cymbalaria muralis GMS.

Ab. Lobes of blade linear or filiform or oblong; flowers solitary in axils of leaves Ad.

Ad. Growing under water; leaves sessile; pedicels 2.5-6 mm long; calyx 3 mm long, p. 21 Bacopa naias Standley

Ad. Growing out of water; stem erect Ae.

Ae. Calyx 6-7 mm long, lobes triangular-acuminate, shorter than tube, p. 37 . . . . .  
. . . . . Lamourouxia multifida HBK.

Ae. Calyx 2-4 mm long Af.

Af. Capsule 10-15 mm long; blades not more than 1 cm long, p. 21 Schistophragma pusilla Bth.Af. Capsule not more than 3 mm long; blades up to 15 mm long, p. 29 Scoparia annua C. & S.

Aa. Blades entire or toothed Ag.

Ag. Calyx-lobes shorter than tube Ah. cp. p. 6

Ah. Blades (median and upper) linear, 1-2 mm wide or narrower; plants blackened in drying Ai.

Ai. Calyx slender, cylindrical at flowering time, longer than thick; flowers sessile; stem unbranched or slightly branched, p. 33 . . . . . BuchneraAi. Calyx cup-shaped; flowers sessile or on pedicels; stem usually bushy-branched, p. 32 . Gerardia

Ah. Blades 6-30 mm wide Aj.

Aj. Calyx 4-6 cm long; capsule 2-3 cm long; flowers in racemes in axils of bracts, p. 31 . . . . .  
. . . . . Escobedia

Aj. Calyx at flowering time 0.35-2 cm long Ak.

Ak. Calyx at flowering time 2 cm long, papery-inflated in fruit; flowers terminal or axillary, in spikes or racemes; lower leaves alternate, p. 32 Melasma physalodes (D. Don) Melchior

Ak. Calyx 0.35-1 cm long Al.

Al. Calyx at flowering time 5-8 mm long; teeth wide; corolla yellow; leaves 1-5 cm long, p. 19 . . . . . MimulusAl. Calyx 3.5 mm long; teeth lanceolate; corolla purple or lilac; leaves 0.7-1.5 cm long, p. 26 Lindernia crustacea (L.) F. Muell.

- Ag. Calyx-lobes as long as tube or longer; tube sometimes very short or none Am. cp. p. 5  
 AmCapsule compressed, usually notched at tip; corolla-lobes spreading; corolla-tube very short; sepals distinct; stamens 2, p. 30 . . . . . Speedwell, Veronica  
 An. Capsule not compressed; corolla often tubular An.  
 An.. Pedicel shorter than calyx or none; petiole very short or none Ao. cp. p. 7  
 Ao. Calyx-lobes 4, hairy, 0.5-0.7 mm long; stem prostrate; stamens 2; leaves entire, glabrous, 2-9 mm long, p. 26 . . . . . Micranthemum  
 Ao. Calyx-lobes 5; stamens usually 4 Ap.  
 Ap. Calyx lobed about 1/2 way; capsule depressed-globose; stem and leaves hirsute; flowers sessile, p. 32. . . . . Alectra aspera (C. & S.) L. Wms.  
 Ap. Calyx lobed nearly to base Aq.  
 Aq. Leaves abundantly dotted (at least beneath), glabrous or nearly so, serrate or almost entire, sessile, 2-3.5 cm long, p. 21 . . . . . some species of Bacopa  
 Aq. Leaves not dotted (punctate) Ar.  
 Ar. Leaves linear, mostly less than 10 mm long; pedicels shorter than leaves; stems glabrous; capsule linear, 10-15 mm long; calyx 2-4 mm long, p. 21 . . . . . Schistophragma pusilla Bth.  
 Ar. Leaves oblong or ovate to orbicular As.  
 As. Leaves acute or acuminate at tip, sessile, at least lower ones serrate, 2-8 cm long; stem erect, at most 40-100 cm tall; pedicels almost none; sepals 5 mm long; herb, p. 21 . . . . . Stemodia durantifolia (L.) Sw.  
 As. Leaves obtuse or rounded at tip, 7-20 mm long; stems up to 15 or 20 cm tall, spreading, much branched; leaves on petioles; pedicels very short At.  
 At. Leaves rounded at base; whole plant short-hairy or glabrous; capsule oblong, 8-11 mm long, p. 27 . . . . . Lindernia diffusa (L.) D. & J.  
 At. Leaves cuneate at base; stem densely viscid-hairy; capsule 2.5-3 mm long, subglobose, p. 20 . . . . . Stemodia verticillata (Miller) Sprague

An. Pedicels longer than calyx or equaling calyx: Au.

Au. Stems abundantly hairy Av.

Av. Leaves on petioles, crenate, rounded to cuneate at base, often dotted (punctate) beneath; calyx-lobes much longer than tube, nearly equal; stems sometimes with long hairs, p. 20 . . . . . some species of Stemodia

Av. Leaves sessile; calyx-lobes ovate or cordate, not much, if any, longer than tube Aw.

Aw. Leaves clasping stem, entire, 8-15 mm long; calyx-lobes conspicuously unequal, longer ones 4-5 mm long; stem with long hairs; herb, p. 24 . . . . .

. . . . . Bacopa salzmannii (Bth.) Wettstein

Aw. Leaves united around stem, toothed, up to 16 cm long; calyx-lobes somewhat unequal, not quite equaling tube, about 1.5 cm long, p. 18 . . . . .

. . . . . Hemichaena fruticosa Bth.

Au. Stem glabrous or slightly hairy; calyx-tube short or none; leaves sessile or petiole short Ax.

Ax. Calyx-lobes unequal, outer ones ovate, p. 21 . . . . .

. . . . . some species of Bacopa

Ax. Calyx-lobes equal or nearly so, lanceolate or narrower Ay.

Ay. Leaves 2-7 cm long, glabrous; petiole 1 cm long; calyx up to 12 mm long, lobes slightly unequal, linear or linear-lanceolate; stem up to 1 m tall, shrubby, p. 20 . . . . . Stemodia fruticosa Lundell

Ay. Leaves 3-20 mm long; calyx 2-10 mm long Az.

Az. Leaves not dotted or only slightly so Ba.

Ba. Leaves linear or oblanceolate; calyx 3.5 mm long; capsule globose or subglobose; corolla yellow, 8-10 mm long, p. 19 . . . . .

. . . . . Gratiola oresbia Rob.

Ba. Leaves ovate, 1-2 cm long; calyx 2-3.5 mm long; corolla white to purple, p. 26 . . . . .

. . . . . some species of Lindernia

Az. Leaves copiously clearly dotted (punctate); sepals 1.5-2.5 mm long Bb.

Bb. Stem erect, not rooting at nodes, commonly much branched; lower leaves toothed or lobed or entire; leaves narrowed at base to short petiole; corolla yellow or white, p. 29 Scoparia

Bb. Stem creeping, rooting at nodes; lower and other leaves entire or nearly so, obtuse or rounded at tip, rounded or truncate at base, p. 27 Lindernia rotundifolia (L.) Standley

& L. Wms.

1. EREMOGETON Standley & L. Williams

Herbs, somewhat woody, to small trees, hairy. Leaves alternate, entire or nearly so. Flowers axillary, solitary, on long pedicels. Calyx deeply lobed; lobes 5. Corolla wide-tubular, 2-lipped; lobes 5, almost equal. Stamens 2; sterile stamens none. Capsule ovoid, acuminate.

1. Eremogeton grandiflorus (Gray) Standley & L. Wms., Ceiba 3:172. 1953. Small tree, sometimes 6 m tall. Young branches tomentose. Leaves elliptic, or ovate, or obovate, obtuse, toothed or entire, acute at base, hairy above and beneath; petioles short. Pedicels sometimes 6 cm long. Calyx-lobes narrow, acute, unequal, finely hairy, sometimes 3 cm long; Corolla 6-8 cm long, white or yellowish. Capsule 2-3 cm long. Guatemala (US).

2. ALONSOA Ruiz & Pavon

Herbs, glabrous except in inflorescence. Upper leaves alternate, others opposite or more than 2 at a node. Flowers on pedicels, in terminal racemes. Calyx lobed to base. Corolla campanulate; lobes unequal. Stamens 4. Capsule ovoid.

1. Alonsoa meridionalis (L. f.) Kuntze, Rev. Gen. Pl. 2: 457. 1891. Leaves on petioles, larger ones 5-10 cm long. Calyx 4 mm long. Corolla about twice as long as calyx, orange or reddish. S. Mexico, Salvador, Honduras, Costa Rica to Peru. Fl. Costa Rica 1100. 1938. Fl. Guatemala 9:326. 1973.

3. ANGELONIA Humboldt, Bonpland & Kunth

Herbs, glabrous or hairy. Leaves opposite or the upper alternate, sessile or almost sessile, serrulate or almost entire. Flowers on pedicels, axillary or in terminal racemes. Calyx 5-lobed almost to base. Corolla 5-lobed, 2-lipped, blue, lilac or violet; tube very short. Stamens 4. Capsule globose (in ours) or ellipsoid.

- A. Blades narrowed to base, 5-10 cm long . . . . . 1. Angelonia angustifolia Bth.  
 A. Blades widened, often clasping at base, 2-5 cm long . . . . . 2. Angelonia ciliaris Rob.

1. Angelonia angustifolia Bth. in DC. Prodr. 10:254. 1846. S. Mexico and cultivated in Guatemala, Honduras, Salvador and Costa Rica (US).

Nicaragua: Dept. Managua, Managua, cult. Maxon, Harvey & Valentine 7246 (US).

2. Angelonia ciliaris Robinson, Proc. Amer. Acad. 45 :400. 1910. British Honduras (US). Nicaragua (specimen not seen); Fl. Guatemala 9:327. 1973.

#### 4. CALCEOLARIA Linnaeus

Herbs (in Central America) or shrubs. Leaves opposite or more than 2 at a node, in ours toothed to deeply lobed or pinnatisect; lobes acute. Petioles long. Flowers in cymes, mostly yellow. Calyx deeply 4-parted; lobes almost equal. Corolla 2-lipped, parted almost to base, lower lip much larger than upper lip, often inflated, globose; tube short. Stamens 2.

A. Petioles widened and clasping at base; calyx-lobes 10-15 mm long at flowering time; corolla 1.5 cm long . . . . . 1. Calceolaria trilobata Hemsley

A. Petioles not widened, not clasping at base B.

B. Blades pinnatisect or lowest 3-lobed; calyx at flowering time 4-6 mm long; corolla 1 cm long . . . . . 2. Calceolaria mexicana Bth.

B. Blades toothed, not deeply divided; corolla 2 cm long C.

C. Blades oblong-lanceolate, acuminate, hairy . . . . . 3. Calceolaria irazuensis Donn. Smith

C. Blades narrowly lanceolate, 9-16 mm wide, 4-7 cm long, gradually long-attenuate, minutely puberulent . . . . . 4. Calceolaria storkii Standley

1. Calceolaria trilobata Hemsley, Biol. Centr. Amer. Bot. 2:439. 1882. Calceolaria sciadephora Donn. Smith, Bot. Gaz. 25:151. 1898.

Guatemala (US), Costa Rica (US), Panama; Fl. Guatemala 9:341. 1973.

2. Calceolaria mexicana Bth., Pl. Hartweg. 47. 1840. Costa Rica (US), Salvador to Panama; Fl. Guatemala 9:339. 1973.

3. Calceolaria irazuensis Donn. Smith, Bot. Gaz. 20:292. 1895. Calceolaria costaricensis Kraenzl., Ann. Hofmus. Wien 22:192. 1907. Costa Rica (US).

4. Calceolaria storkii Standley, Fieldiana, Bot. 18, part 3, 1103. 1898. Costa Rica (FLAS, US).

#### 5. CYMBALARIA Hill

Herbs, prostrate, glabrous. Leaves opposite, palmately lobed; lobes obtuse. Petiole long. Flowers solitary in axils of leaves. Calyx deeply 5-lobed. Corolla 2-lipped. Stamens 4.

1. Cymbalaria muralis Gaertner, Meyer & Schreber, Fl. Welt. 2:397. 1800. Linaria cymbalaria (L.) Miller, Gard.

Dict. ed. 8, no. 17. 1768. Leaves kidney-shaped, 3-5-lobed. Petioles long. Corolla blue or lilac. Guatemala, Honduras (US), Costa Rica, Europe. Fl. Guatemala 9:348. 1973.

6. ANTIRRHINUM Linnaeus Snapdragon

Herbs. Leaves entire, alternate. Flowers in terminal racemes or lower ones axillary. Calyx 5-lobed almost to base. Corolla irregular, 2-lipped. Stamens 4. Capsule ovoid (in ours) or globose.

1. Antirrhinum majus L., Sp. Pl. 617. 1753. Stem glandular-hairy above. Leaves acute at each end, 2.5-7 cm long. Flowers on pedicels, various in color. Corolla much longer than calyx. Calyx 4-6 mm long. Capsule 5-10 mm long. Honduras (US), Salvador (US).

7. MAURANDYA Ortega

Herbs, climbing. Leaves on petioles; blades triangular, 3-5-lobed, upper ones alternate, lower ones opposite. Flowers axillary, solitary. Pedicels 2-10 cm long. Calyx united at base. Corolla 2-lipped. Stamens 4. Capsule globose.

A. Stem and leaves densely or sparsely villous; pedicels 2-6 cm long; calyx 1.5-2 cm long; seeds winged . . . . .  
 . . . . . 1. Maurandya erubescens (D. Don) Gray

A. Stem and leaves glabrous; calyx 10-15 mm long at flowering time; seeds not winged B.

B. Pedicels 3-5 cm long; calyx glandular-pilose . . . . .  
 . . . . . 2. Maurandya barclaiana Lindley

B. Pedicels 5-10 cm long; calyx glabrous . . . . .  
 . . . . . 3. Maurandya scandens (Cav.) Pers.

1. Maurandya erubescens (D. Don) Gray, Proc. Am. Acad. 7:377. 1868. Central and s. Mexico, Guatemala; Fl. Guatemala 9:377. 1973.

2. Maurandya barclaiana Lindley, Bot. Reg. 13:t. 1108. 1827. Guatemala and other parts of Central America; Fl. Guatemala 9:377. 1973.

3. Maurandya scandens (Cav.) Pers., Syn. Pl. 2:15, t.160. 1807. Mexico, Guatemala, and in many places in the tropics; Fl. Guatemala 9:377. 1973.

8. LEUCOCARPUS D. Don

Herbs. Stem narrowly winged. Leaves opposite, sessile, cordate-clasping at base, serrulate. Cymes axillary, on peduncles. Calyx 5-toothed, cup-shaped, teeth short. Corolla long-

tubular, 2-lipped. Fruit fleshy, globose.

1. Leucocarpus perfoliatus (HBK.) Bth. in DC. Prodr. 10: 335. 1846. Plant glabrous. Leaves narrowly lanceolate, cordate-clasping. Flowers on pedicels. Corolla 1.5 cm long. Fruit white, 1 cm or more thick.

Guatemala, Honduras, Salvador, Costa Rica, Panama.

9. GIBSONIOTHAMNUS L. Williams

Shrubs, much branched. Leaves opposite, on petioles. Calyx 5-lobed, cup-shaped. Corolla regular, tubular; lobes almost equal, short. Stamens 4; 1 sterile rudiment present. Fruit fleshy.

A. Blades 1.5-2.5 cm wide, 4-6 cm long; inflorescence of sessile cymules; pedicels 1.5-2 cm long . . . . .  
 . . . . . 3. Gibsoniothamnus moldenkeanus (Standley) L. Wms.

A. Blades 3-8 cm wide, 5-13 cm long B.

B. Flowers in fascicles; calyx-lobes 1-2 mm long . . . . .

. . . . . 1. Gibsoniothamnus cornutus (Donn. Smith) A. Gentry

B. Flowers in racemes or solitary; pedicels at most 2 cm long; calyx-lobes 3.5 mm long . . . . .

. . . . . 2. Gibsoniothamnus mimicus (St. & St.) L. Wms.

1. Gibsoniothamnus cornutus (Donn. Smith) A. Gentry, Fieldiana, Bot. 34:55. 1971.

Guatemala; Fl. Guatemala 9:357. 1973.

2. Gibsoniothamnus mimicus (St. & St.) L. Wms., Fieldiana, Bot. 32:214. 1970.

Guatemala; Fl. Guatemala 9:357. 1973.

3. Gibsoniothamnus moldenkeanus (Standley) L. Wms., Fieldiana, Bot. 32:214. 1970.

Mexico; known only from type; Fl. Guatemala 9:359. 1973.

10. SCHLEGELIA Miquel Dermatocalyx Oersted

For full descriptions, see Gentry, A. H. Fl. Panama, Ann. Mo. Bot. Gard. 60:923-930. 1973.

Vines, shrubs or small trees, sometimes epiphytic, glabrous except when young and in inflorescence. Leaves entire, opposite, on petioles, leathery. Flowers in axillary racemes or panicles. Calyx cup-shaped, shallowly 3-4-toothed, persistent; teeth short, wide. Corolla tubular, 5-lobed. Stamens 4; staminodium 1. Fruit globose, fleshy,



## A. Calyx 4-8 mm long B.

B. Veins of blades conspicuously raised beneath; blades 4-13.2 cm wide, 10-33 cm long, 2-5 times as long as wide; panicle very dense 5. Schlegelia sulfurea Diels

B. Veins not conspicuously raised beneath; blades 2.3 times or less than 2 times as long as wide; petiole 1-2.5 cm long; inflorescence open or less dense C.

C. Inflorescence an open, unbranched raceme . . . . .  
. . . . . 3. Schlegelia fuscata A. Gentry

C. Inflorescence a contracted panicle; blades cuneate at base . . 4. Schlegelia parviflora (Oersted) Monachino

## A. Calyx 9-14 mm long D.

D. Petiole 24-30 mm long; blades rounded at both ends, 11-20 cm wide, 30-45 cm long; veins raised beneath . . . . .  
. . . . . 1. Schlegelia dressleri A. Gentry

## D. Petiole 8-16 mm long E.

E. Branchlets hairy at least at nodes; blades rounded or apiculate at tip, widely cuneate at base, 3.8-7.4 cm wide, 7.6-11 cm long; petiole 8-16 mm long . . . . .  
. . . . . 2. Schlegelia nicaraguensis Standley

E. Branchlets glabrous; blades acute or obtuse, 4-9 cm wide, 7-14 cm long; petiole about 1 cm long . . . . .  
. . . . . 6. Schlegelia silvicola L. Wms.

1. Schlegelia dressleri A. Gentry, Ann. Mo. Bot. Gard. 60: 924. 1973. Panama, La Encida near Cerro Jefe. Dressler 3507 (MO, holotype; PMA, isotype).

2. Schlegelia nicaraguensis Standley, Tropical Woods no. 16: 44. 1928. Guatemala, Nicaragua, Panama; Fl. Panama 60: 927. 1973.

Nicaragua, Dept. Zelaya, Bluefields. Englesing 99 (F, GH, K).

3. Schlegelia fuscata A. Gentry, Ann. Mo. Bot. Gard. 60:925. 1973. Doubtfully distinct from Schlegelia parviflora. Panama, Cerro Jefe. Gentry 2875, type (MO).

4. Schlegelia parviflora (Oersted) Monachino, Phytologia 3: 103. 1949. Dermatocalyx parviflorus Oersted, Kjoeb. Vidensk. Meddel. 29. 1856. British Honduras and Honduras to Brazil; Fl. Panama 60:928. 1973. Nicaragua; Fl. Guatemala 9:398. 1973.

5. Schlegelia sulfurea Diels, Notizblatt. Bot. Gard. Berlin 14:39. 1938. Guatemala to Ecuador; Fl. Panama 60:930. 1973.

6. Schlegelia silvicola L. Wms., Fieldiana, Bot. 34:126, t. 3. 1972. Guatemala (US); Nicaragua; Fl. Guatemala 9:398. 1973.

11. RUSSELLIA Jacquin

Reference: Carlson, Margery C. Monograph of the genus Russelia. Fieldiana, Bot. 29:231-292. 1957.

Herbs, with young stems angled. Leaves opposite or more than 2 at a node, sessile or nearly so, ovate, serrate or rarely entire, usually with resinous dots (punctate). Flowers in axillary cymes or terminal panicles. Calyx 5-lobed. Corolla red, tubular, 2-lipped. Stamens 4; staminodium short or none. Capsule almost globose or ovoid.

- A. Blades small, falling very early; pedicels 1-1.5 cm long . . . . . 1. Russelia equisetiformis C. & S.
- A. Blades persistent; petioles 1-5(-9) mm long B.
- B. Stem terete or only slightly angled C.
- C. Young stems densely or abundantly hairy; calyx-lobes hairy; capsules 4 mm long D.
- D. Leaves crenate-serrate, pilose with septate hairs above and beneath; calyx-lobes 5-7 mm long, pilose . . . . . 2. Russelia rugosa Rob.
- D. Leaves sharply serrate, with gland-tipped hairs above and beneath; calyx-lobes 8-10 mm long, densely glandular-hairy 3. Russelia steyermarkii Carlson
- C. Young stems glabrous or nearly so except sometimes at tip E.
- E. Blades resinous-dotted on both surfaces, 3-4.5 cm wide, 6-9 cm long; sepals 3.5-4.5 mm long . . . . . 4. Russelia acuminata Carlson
- E. Blades dotted on lower surface only F.
- F. Internodes 4-5 cm long; petioles less than 2 mm long; peduncles 8-10 mm long . . . . . 5. Russelia laciniata St. & St.
- F. Internodes 8-10 cm long; petioles 4-5 mm long; peduncles 5-8 mm long; calyx 4-7 mm long . . . . . 6. Russelia coccinea (L.) Wettstein
- B. Stems definitely ridged or angled or winged G.
- G. Blades entire; petioles 7-9 mm long; internodes 2.5-7 cm long; calyx 3.5 mm long; capsules globose, 1 cm long including beak 7. Russelia campechiana Standley
- G. Blades toothed; petioles 1-5 mm long H.
- H. Calyx-lobes 6-7 mm long, lanceolate, hairy on midrib; stem glabrous except at tip; internodes 2-5 cm long . . . . . 8. Russelia longisepala Carlson
- H. Calyx-lobes 3-4(-4.5) mm long, ovate I.

- I. Capsules about twice as long as calyx, about 8 mm long; blades 1-5 cm wide, 1.5-8 cm long, glabrous or hairy, glandular-dotted or not; peduncles more than 5, up to 20 mm long; blades truncate or rounded at base . . . . . 9. Russelia sarmentosa Jacq.
- I. Capsules less than twice as long as calyx, sometimes shorter than calyx, at most 5.5 mm long J.
- J. Blades 8-15 mm wide, 1-2.5 cm long, truncate to wedge-shaped at base K.
- K. Blades glabrous above and beneath; capsule slightly longer than calyx; young stems glabrous . . . . . 10. Russelia standleyi Carlson
- K. Blades densely hirsute above and beneath; capsule equaling calyx; young stem densely hirsute . . . . . 11. Russelia parvifolia Carlson
- J. Blades 3-4.5 cm wide, 6-10 cm long L.
- L. Peduncles less than 5 mm long; blades sparsely or densely hairy, 4 cm wide, up to 7 cm long, widely cuneate or obtuse at base; capsule longer than calyx, 5.5 mm long; stems hairy or glabrous . . . . . 12. Russelia chiapensis Lundell
- L. Peduncles 10-15 mm long; blades, at least when young, resinous-dotted above and beneath, glabrous or minutely hairy on main veins beneath, acute to acuminate at base; stem tending to be woody at base, glabrous or nearly so; inflorescence 5-7-flowered; capsules globose, without beak . 13. Russelia longifolia Carlson

1. Russelia equisetiformis C. & S., Linnaea 6:377. 1831. Mexico (US), Guatemala (US), Salvador (US). Nicaragua; Dept. Zelaya, Bluefields. Nichols 896 (BM, ENAG, SEYM).
2. Russelia rugosa Rob., Proc. Am. Acad. 43:58. 1907. Guatemala (US); Nicaragua, Salas, 1966.
3. Russelia steyermarkii Carlson, Fieldiana, Bot. 29:272, fig. 4. 1957. Guatemala; Fl. Guatemala 9:394. 1973.
4. Russelia acuminata Carlson, Fieldiana, Bot. 29:248, fig. 1. 1957. Guatemala; Fl. Guatemala 9:389. 1973.
5. Russelia laciniata St. & St., Field Mus. Bot. 11:379. 1940. Guatemala, known from the type only, Steyermark 37982; Fl. Guatemala 9:392. 1973.
6. Russelia coccinea (L.) Wettstein in Engler & Prantl, Pflanzenfam. IV, 3b:62 1891. Mexico, Guatemala, West Indies, China; Fl. Guatemala 9:390. 1973.
7. Russelia campechiana Standley, Contr. U. S. Nat. Herb. 23:1309. 1924.

Mexico (US), British Honduras (US), Guatemala (US).

8. Russelia longisepala Carlson, Fieldiana, Bot. 29:254, fig. 2. 1957. Guatemala, cotype (US).

9. Russelia sarmentosa Jacq., Enum. Pl. Carib. 25. 1760. Russelia polyedra Zucc. in Abh. Akad. Muench. 2:328. 1831-6. Russelia sarmentosa f. eglandulata Carlson, Fieldiana, Bot. 29:263. 1957. Russelia sarmentosa f. pubescens Carlson, Fieldiana, Bot. 29:263. 1957. Russelia sarmentosa f. velutina Carlson, Fieldiana, Bot. 29:263. 1957.

A. Thickened angles of stem glabrous or nearly so; blades glabrous to sparsely hairy beneath on veins; at least young leaves resinous-dotted above and beneath . . . . . var. sarmentosa

A. Thickened angles of stem usually hairy; blades densely hairy beneath on veins, with only occasional dots beneath; black pits sometimes beneath, especially on young blades . . . . . var. nicaraguensis Carlson

Var. sarmentosa. Mexico (US), British Honduras (US), Guatemala (US), Honduras (US), Salvador (US), Costa Rica (US), Panama (US). I have seen no specimen from Nicaragua which is this variety.

Var. nicaraguensis. Carlson.

All the specimens from Nicaragua which I have seen are this variety.

Nicaragua:

Dept. Zelaya; Puerto Cabezas. Marshall & Neill 6579 (ENAG, FLAS, MO, SEYM, US).

Rama. Zelaya 320 (VT); Marshall & Neill 6483 (ENAG, FLAS, MO).

Dept. Nueva Segovia, Ocotal. Seymour 867 (VT).

Dept. Madriz, Yalaguina. Moore 939 (VT).

Dept. Esteli, NW of Puebla Nueva. Williams & Molina 42402 (US).

Dept. Esteli?, 43 miles S of Nicaragua-Honduras boundary, Inter American Highway, Morley 753 (US).

Dept. Chinandega, Volcan El Viejo. Baker 880 (US).

Dept. Leon, Momotombo. Robbins 6117 (VT).

Near Santa Rosa. Williams & Molina 42441 (US).

Dept. Boaco, Boaco. Nichols 1477 (NY, WDP, WIS):  
Seymour 5432 (SEYM, SMU, UC).

- Dept. Boaco?, Between Boaco cutoff and Acoyapa. Bunting & Licht 707 (US).
- Dept. Chontales, Acoyapa. Dudey 1672 (ENAG, GH, SEYM); Marshall & Neill 7081 (MO).  
Apompua. Seymour 2695 (BM, SEYM).  
San Miguelito. Shank & Molina 4583 (US).  
Santo Tomas. Nichols 282 (VT).
- Dept. Managua, El Crucero. Atwood & Neill 6764 (FLAS, MO).  
Managua. Chaves 63 (US); Artemio 12 (US),  
69 (US); Garnier 267 (US); Maxon, Harvey  
& Valentine 7366 (US), 7451 (US).  
Masachapa. Nichols 1376 (VT).
- Dept. Masaya, La Concepcion. Nichols 917 (VT).  
Masaya. Baker 580 (US); Hamblett 87 (BM, NY,  
SMU, WDP, WIS); Zelaya 155 (ENAG,  
F, GH, MO, SEYM, UC).  
Santiago. Robbins 5549 (DUKE, ENAG, MICH,  
MO, SEYM).  
Santiago Volcano. Maxon 7654 (US), 7665 (US);  
7434, type (US).  
Volcan Masaya. Atwood A342 (MSC).
- Dept. Carazo, Casa Colorada. Narvaez 542 (BM, ENAG, F,  
GH, MO, NY, SEYM, SMU, UC, WDP).  
Santa Teresa. Atwood 1281 (BM); Dudey 1287  
(ENAG, F, GH, MO, SEYM, UC);  
Nichols 1318 (SMU).
- Dept. Rivas, Ometepe Is. Shimek & Smith 20 (US).  
San Juan del Sur. Narvaez 1257 (BM, ENAG, F,  
GH, MO, NY, SEYM, SMU, UC, WDP);  
Nichols 1262 (MO, SEYM).
- Without definite locality. Wright (US).

10. Russelia standleyi Carlson, Fieldiana, Bot. 29:257, fig. 2. 1957. Guatemala, type, Standley 77093.

11. Russelia parvifolia Carlson, Fieldiana, Bot. 29:282, fig. 6. 1957. Guatemala, type, Deam 6096.

12. Russelia chiapensis Lundell, Field & Lab. 13:12. 1945. Known from Mexico only, Contreras 5579.

13. Russelia longifolia Carlson, Fieldiana, Bot. 29:268, fig. 3. 1957. Guatemala, Honduras (US); Fl. Guatemala 9:392. 1973.

Excluded species. Russelia verticillata HBK., Nov. Gen. & Sp. 360. 1817. Carlson (l. c.) does not indicate its occurrence outside of Mexico and comments: "It is evident that the species has not been understood . . . ."

12. PENSTEMON Mitchell Beard-tongue

Herbs or rarely shrubs. Leaves opposite, lower ones on petioles, upper ones smaller, sessile. Flowers in terminal panicle. Calyx deeply 5-lobed, lobes overlapping. Corolla tubular, long, 2-lipped. Fertile stamens 4; additional stamen sterile. Capsule ovoid.

A. Stem viscid-villous; stem-leaves clasping, finely serrulate or almost entire; sepals 10 mm long, acute or almost obtuse, densely viscid-villous . 1. Penstemon perfoliatus Brongn.

A. Stem glabrous except sometimes in inflorescence; sepals 6-8 mm long, glabrous or hairy B.

B. Leaves sharply serrate; sepals acute-attenuate . . . . .  
 . . . . . 2. Penstemon campanulatus (Cav.) Willd.

B. Leaves entire; sepals obtuse . . . . .  
 . . . . . 3. Penstemon gentianoides (HBK.) Poiret

1. Penstemon perfoliatus Brongn., Hort. Univ. 5:265. 1844. Central and s. Mexico, doubtfully in Guatemala; Fl. Guatemala 9:386. 1973.

2. Penstemon campanulatus (Cav.) Willd., Sp. Pl. 3:228. 1800. Mexico, Guatemala; Fl. Guatemala 9:385. 1973.

3. Penstemon gentianoides (HBK.) Poiret, Dict. Sci. Nat. 38:385. 1818. Mexico, Guatemala (US).

13. TETRANEMA Bentham

Herbs. Stems very short or almost none. Leaves opposite, mostly near base of stem, crenate-dentate or entire. Flowers axillary, cymose or subumbellate, on long peduncles. Calyx of distinct, attenuate-acuminate sepals. Corolla cup-shaped; lobes shorter than tube. Stamens 4. Capsule ovoid, glabrous.

A. Peduncle equaling or surpassing leaves; flowers in umbels; pedicels 5-13 mm long . . . . .  
 . . . . . 2. Tetranema roseum (M. & G.) St. & St.

A. Peduncle shorter than leaves; flowers in cymes B.

B. Pedicels 1-2 cm long; calyx 6-8 mm long . . . . .  
 . . . . . 1. Tetranema evolutum Donn. Smith

B. Pedicels 5 mm long; calyx 2.5-3 mm long . . . . .  
 . . . . . 3. Tetranema cymosum L. Wms.

1. Tetranema evolutum Donn. Smith, Bot. Gaz. 14:29. 1889. Guatemala (US).

2. Tetranema roseum (M. & G.) St. & St., Field Mus. Bot. 23:235. 1947. Allophyton mexicanum Pennell, Proc. Acad. Nat. Sci. Phila. 77:271. 1925. Honduras (US), Costa Rica (US). S. Mexico, British Honduras, Honduras; Fl. Guatemala 9:409. 1973.

3. Tetranema cymosum L. Wms., Fieldiana, Bot. 34:129, fig. 1972. Guatemala, type Steyermark 39858.

#### 14. UROSKINNERA Lindley

Shrubs, hairy. Leaves opposite, dentate, on petioles. Flowers in terminal or axillary spikes or racemes. Calyx tubular-campanulate, 4-5-toothed. Corolla tubular, dilated upward, 5-lobed; lobes almost equal. Stamens 4; staminode present. Capsule globose.

1. Uroskinnera spectabilis Lindley, Gard. Chron. 36. 1857. Leaves 2.5-10 cm wide, 4-18 cm long, densely pilose beneath. Calyx 5 mm long, hirsute. Corolla 4 cm long. Guatemala (US). Cultivated in Europe, Java and British Guiana.

#### 15. HEMICHAEANA Benth

Herbs or shrubs. Leaves opposite toothed. Flowers axillary. Calyx 5-toothed, cup-shaped. Corolla 2-lipped. Stamens 4, fertile. Pedicels 12-25 mm long. Capsule ovoid or oblong.

A. Blades 1.5-4.5 cm long, acute or obtuse, almost sessile, not united around stem; calyx 6-10 mm long; corolla red or orange, 2.5-3.5 cm long

2. Hemichaena rugosa (Bth.) Thieret  
 A. Blades at most 16 cm long, acute to attenuate, united around stem; calyx 2 cm long; corolla yellow, 4-5 cm long . . . . .  
 . . . . . 1. Hemichaena fruticosa Bth.

1. Hemichaena fruticosa Bth., Pl. Hartweg. 78. 1841. Herb, densely hairy. Stem simple, 1 m tall. Leaves sessile, cordate at base, acuminate, toothed. Flowers in axillary cymes on peduncles. Calyx-lobes narrow, 5. Corolla 4-5 cm long. Capsule as long as calyx. Mexico, Costa Rica; Fl. Guatemala 9:362. 1973.

2. Hemichaena rugosa (Bth.) Thieret, Fieldiana, Bot. 34: 96. 1972. Mexico, Honduras; Fl. Guatemala 9:363. 1973.



16. MIMULUS Linnaeus Monkey-flower

Herbs (ours), rarely shrubs. Leaves opposite. Flowers solitary in axils of leaves, or terminal in racemes. Calyx tubular or cup-shaped, 5-toothed, teeth much shorter than tube. Corolla 2-lipped or lobes equal. Stamens 4. Capsule oblong or linear.

- A. Upper leaves sessile, clasping, rounded at tip, 3-5-palmately nerved; stem glabrous or sparsely villous or puberulent . . . . . 1. Mimulus glabratus HBK.  
 A. Upper leaves (and others) on petioles, acute at tip, pinnately nerved; stem with long soft hairs . . . . . 2. Mimulus pachystylus Grant

1. Mimulus glabratus HBK., Nov. Gen. & Sp. 2:370. 1817.  
 United States, Mexico, Guatemala (US), s. America.  
 Nicaragua: Dept. Esteli, Salto de Estanzuela.

Atwood & Neill 148 (MSC).

2. Mimulus pachystylus Grant, Ann. Mo. Bot. Gard. 11:234. 1924. Mexico, Guatemala; Fl. Guatemala 9:383. 1973.

17. MAZUS Loureiro

Herbs. Lower leaves opposite, upper alternate, toothed. Flowers in racemes without bracts or leaves. Calyx lobed 1/2 way, cup-shaped, lobes 5. Corolla tubular, 2-lipped. Stamens 4. Capsule globose or compressed.

1. Mazus japonicus (Thunb.) Kuntze, Rev. Gen. 462. 1891.  
Mazus rugosus Lour., Fl. Cochinch. 385. 1790.  
 Costa Rica (US).  
 Nicaragua: Dept. Managua?, Sierra de Managua.

Garnier A286 (US).

18. GRATIOLA Linnaeus Hedge-hyssop

Herbs. Leaves opposite, linear or lanceolate, sessile, entire or nearly so. Flowers axillary, solitary, pedicels longer than calyx. Calyx-lobes 5, usually nearly equal, distinct to base. Corolla tubular, yellow. Stamens 4. Capsule globose or subglobose.

1. Gratiola oresbia Robinson, Proc. Am. Acad. 44:614. 1909. Pedicels at most 1.5 cm long. Calyx-lobes 3.5 mm long, linear-lanceolate, acute. Corolla 8-10 mm long, 2-lipped, tubular. Capsule globose, about 3.5 mm thick.  
 Guatemala; Fl. Guatemala 9:359. 1973.

19. STEMODIA Linnaeus

Herbs, glabrous or variously hairy. Leaves opposite or more than 2 at a node. Flowers in axils of leaves, upper ones sometimes in a spike. Calyx 5-lobed often nearly to base, lobes equal or unequal. Corolla tubular, 3-lobed. Stamens 4.

- A. Flowers sessile or almost sessile; stem and leaves viscid-hairy B.  
 B. Leaves sessile, acute or acuminate, 3-8 cm long . . . . .  
 . . . . . 6. Stemodia durantifolia (L.) Sw.  
 B. Leaves on petioles, obtuse, 7-15 mm long . . . . .  
 . . . . . 4. Stemodia verticillata (Miller) Sprague
- A. Flowers on long pedicels; pedicels often 2 cm long C.  
 C. Blades acute or acuminate, glabrous when mature, pilose when young, 2-7 cm long; pedicels 2 cm long . . . . .  
 . . . . . 1. Stemodia fruticosa Lundell
- C. Blades obtuse at tip, rounded to wedge-shaped at base, 0.7-3.5 cm long D.  
 D. Blades 2-3.5 cm long, dotted beneath; sepals 7-9 mm long . . . . . 3. Stemodia peduncularis Bth.  
 D. Blades at most 2 cm long, villous; sepals 4-5 mm long, unequal E.  
 E. Sepals 4-5 mm long, one slightly longer and wider than others; valves of capsule very obtuse; leaves glandular-dotted beneath . . . . .  
 . . . . . 5. Stemodia angulata Oersted  
 E. Sepals 4 mm long, one linear, obtuse, the others shorter, awl-like; valves of capsule acuminate . . . . .  
 . . . . . 2. Stemodia jorulensis HBK.

1. Stemodia fruticosa Lundell, Contr. Univ. Mich, Herb. 4: 27. 1940. British Honduras, type, Gentle 2252.

Honduras (US), Salvador (US). Nicaragua; Fl. Guatemala 9: 405. 1973.

2. Stemodia jorulensis HBK., Nov. Gen. & Sp. 2:358. 1817. Mexico, Guatemala, Salvador to Panama, Cuba; Fl. Guatemala 9:406. 1973. Nicaragua: Dept. Rivas, Ometepe Is.

Shimek & Smith 112 (US).

3. Stemodia peduncularis Bth. in DC. Prodr. 10:382. 1846. Mexico (US), Guatemala (US), Honduras (US), Costa Rica (US), Panama (US).

4. Stemodia verticillata (Miller) Sprague, Kew Bull. 211. 1921. Erinus verticillatus Miller, Gard. Dict. ed. 8. no. 5. 1768. Stemodia parviflora (Miller) Aiton, Hort. Kew. ed. 2. 4:52. 1812. Lendneria humilis Minod., Bull. Soc. Bot. Geneve II. 10:240. 1918. Mexico (US), Honduras (US), Costa Rica (US). Nicaragua: Without definite locality. Wright (US)

as *Lendneria parviflora* Aiton.

5. *Stemodia angulata* Oersted, Vidensk. Meddel. Kjoeb. 1853: 22. 1854. Guatemala (US), Costa Rica (US). Mexico, British Honduras, Guatemala, Salvador, Honduras, Costa Rica, Panama; Fl. Guatemala 9:404. 1973.

6. *Stemodia durantifolia* (L.) Sw., Obs. Bot. 240. 1791. The only species in Central America with sessile leaves. Mexico (US), British Honduras (US), Guatemala (US), Honduras (US), Salvador (US), Costa Rica (US), Panama (FLAS).

## 20. SCHISTOPHRAGMA Bentham

Herbs. Leaves opposite, entire or deeply divided. Flowers solitary in axils of leaves. Calyx 5-lobed almost to base, lobes almost equal. Corolla tubular, 2-lipped. Stamens 4. Capsule linear.

1. *Schistophragma pusilla* Bth. in DC. Prodr. 10:392. 1846. *Conobea pusilla* (Bth.) Jackson, Index Kew. 1, fasc. 1:596. 1893. Mexico, Guatemala (US), Honduras, Nicaragua, Colombia; Fl. Guatemala 9:396. 1973.

Leaves or lobes linear, less than 1 cm long. Stem up to 20 cm tall, 4-angled, glabrous. Calyx 4 mm long. Corolla 5-6 mm long. Capsule 10-15 mm long.

Nicaragua:

Dept. Chinandega, Realejo. Oersted 9477 (US).

Dept. Masaya, Volcan Masaya. Atwood A333 (MSC).

Dept. Granada, Granada. Maxon, Harvey & Valentine 7581 (US).

## 21. LIMOSELLA Linnaeus Mudwort

Herbs, creeping, almost stemless except for stolons, rooting at nodes. Leaves linear, often widened at tip. Flowers in axils of leaves. Calyx 5-toothed, cup-shaped. Corolla-tube short; corolla 3-5-lobed. Stamens usually 4.

1. *Limosella acaulis* Sesse & Mocino, Fl. Mex. ed. 2:143. 1894. Plant glabrous. Blades commonly 2-3 cm long. Pedicels shorter than leaves. Flowers about 2 mm long. Mexico, Guatemala, Venezuela, Peru, Bolivia.

## 22. BACOPA Aublet

Reference: Pennell, F. W. Scrophulariaceae of Colombia. Proc. Phila. Acad. Nat. Sci. 72:136-188. 1920.

Herbs. Leaves opposite, mostly toothed or entire, in 1 species deeply lobed, in some species distinctly dotted (punctate). Flowers axillary or in terminal racemes, solitary or in clusters, sessile or on pedicels. Calyx deeply 5-lobed, lobes

sometimes very unequal. Corolla tubular, 2-lipped. Stamens 4. Capsule globose or ovoid. Distinguished from Lindernia and Micranthemum by having parallel anther cells.

- A. Blades divided into many linear lobes; growing mostly or wholly under water . . . . . 14. Bacopa najas Standley
- A. Blades entire or toothed, usually growing out of water B.
- B. Outer sepals lanceolate or narrower, not conspicuously different from inner sepals; pedicels none or not over 1.5 mm long; calyx 2-2.5 mm long; leaves sessile; stem stout C.
- C. Leaves acute at tip, 2-3 cm long; clasping at base; calyx densely dotted; stem erect, spongy, 4-6 mm thick at base . . . . . 12. Bacopa parviflora L. Wms.
- C. Leaves rounded at tip, cuneate at base, 7-13 mm long; stem procumbent or prostrate . . . . . 13. Bacopa curtipes Standley & L. Wms.
- B. Outer sepals ovate or elliptic, inner ones much narrower except in Bacopa axillaris D.
- D. Leaves attenuate or acute at base E.
- E. Pedicels mostly equaling or longer than leaves F.
- F. Stems with spreading hairs; blades 7-9 mm long, hirsute (at least when young) over entire surface beneath; sepals ciliate, hairy, outer ones 4-5 mm long . . . 2. Bacopa humilis (Pennell) Standley
- F. Stems glabrous or nearly so, at most 30-50 cm long; sepals 6-10 mm long; pedicels mostly longer than leaves G.
- G. Leaves entire, attenuate at base, sessile, 6-20 mm long, dotted, rounded at tip; sepals 6-7 mm long . 3. Bacopa monnieri (L.) Wettstein
- G. Leaves dentate, acute at base, on short petioles, 8-15 mm long, rounded to acute at tip; outer sepals 8-10 mm long . . . . . 4. Bacopa procumbens (Miller) Greenman
- E. Pedicels much shorter than leaves or none; stem stout, erect, 4-6 mm thick at base; flowers 1-several in an axil; leaves dotted, at least beneath H.
- H. Sepals 7-9 mm long, dotted; pedicels 3-10 mm long; leaves acute or attenuate at tip; stem glabrous (or hairy above) . . . . . 5. Bacopa lacertosa Standley
- H. Sepals 3.5-4.5 mm long; pedicels almost none I.
- I. Leaves acute; stem villous, spongy; sepals not dotted 1. Bacopa axillaris (Bth.) Standley

- I. Leaves obtuse; stem glabrous, not spongy . . . . . 6. Bacopa sessiliflora (Bth.) Pulle
- D. Leaves rounded or clasping or subcordate at base J.
- J. Leaves lanceolate, acute at tip, 6 mm wide, 17-21 mm long, clasping at base, dotted; pedicels 6 mm long, shorter than leaves; calyx-lobes acuminate, 2-3 mm long; stem glabrous, erect . . . 7. Bacopa auriculata (Rob.) Greenman
- J. Blades ovate or elliptic to orbicular; stem floating in water or creeping in wet soil K.
- K. Leaves clasping at base; pedicels usually longer than leaves; outer calyx-lobes very obtuse, cordate, long-ciliate; stem with long, dense, spreading hairs . . . . . 7. Bacopa salzmännii (Bth.) Edwall
- K. Leaves not clasping at base; pedicels usually shorter than leaves; sepals not cordate at base; stem glabrous or sparsely pilose L.
- L. Longest sepals 5-7 mm long; capsule 3-4 mm long . . . . . 8. Bacopa violacea (Pennell) Standley
- L. Longest sepals 2.5-3 mm long; pedicels reflexed in fruit M.
- M. Capsule 3-4 mm long . . . . . 10. Bacopa repens (Sw.) Wettstein
- M. Capsule 2.5 mm long . . . . . 9. Bacopa limosa (Pennell) Standley

1. Bacopa axillaris (Bth.) Standley, Journ. Wash. Acad. Sci. 15:460. 1925. *Herpestes axillaris* Bth. in DC. Prodr. 10:396. 1846. Panama, Colombia; Fl. Guatemala 9:330. 1973.

2. Bacopa humilis (Pennell) Standley, Journ. Wash. Acad. Sci. 15:460. 1925. *Monocardia humilis* Pennell, Proc. Phila. Acad. 72:157. 1920. Stems hairy with spreading hairs, 2-10 cm long. Leaves 3-8 mm wide, 7-9 mm long, hirsute (at least when young) over entire surface beneath. Pedicels 6-9 mm long. Sepals all ciliate, the 3 outer 4-5 mm long, hairy over entire outer surface. Panama, Colombia.

3. Bacopa monnieri (L.) Wettstein in Engler & Prantl, Pflanzfam. IV. 3b:77. 1891.  
SE United States, Mexico, British Honduras, Guatemala, Honduras, Salvador, Costa Rica, Panama (all US); W. I., S. A., Old World tropics; Fl. Guatemala 9:332. 1973.  
Nicaragua:

Dept. Nueva Segovia, Jalapa. Seymour 5514 (MO, SEYM).  
Dept. Leon, Leon Viejo. Atwood 1520 (BM, ENAG, F, GH,  
MO, SEYM, SMU).  
Dept. Managua, Managua, Chaves 22 (US);  
Atwood 2612 (MO, SEYM).

Without definite locality. Chaves 288 (US).

4. Bacopa procumbens (Miller) Greenman, Field Mus. Bot. 2:261. 1907. Florida, Mexico (US), Honduras (US), British Honduras to Salvador and Panama, W. I., S. A.; Fl. Guatemala 9:333. 1973.

Nicaragua:

Dept. Zelaya, Bluefields. Seymour 4219a (SEYM).

Corn Is. Atwood 4395 (ENAG, MO, SEYM, SMU).

Dept. Boaco, Boaco. Seymour 3867 (VT).

Camoapa Seymour 3494 (VT).

Dept. Chontales, Acoyapa. Nichols 1743 (BM, ENAG, F, GH, MO, NY, SEYM, SMU, UC, WDP);

Seymour 1773a (ENAG, MSC, WIS).

San Francisco. Seymour 6081 (ENAG, GH, MO, SEYM, SMU).

Santo Tomas. Atwood 2733 (VT).

Dept. Rio San Juan, San Bartolo. Seymour 6249 (VT).

5. Bacopa lacertosa Standley, Field Mus. Bot. 11:140. 1932. Mexico (US), British Honduras (US), Guatemala (US).

Nicaragua:

Dept. Zelaya, Puerto Cabezas. Atwood 4528 (SEYM).

Siuna. Seymour 4981 (MO, SEYM).

Dept. Chontales, Acoyapa. Nichols 1744 (BM, ENAG, NY, SMU). Seymour 1773 (MO, SEYM).

6. Bacopa sessiliflora (Bth.) Pulle, Enum. Pl. Surinam 415. 1906. British Honduras, Nicaragua, Panama, n. S. A.; Fl. Guatemala 9:334. 1973.

Nicaragua:

Dept. Zelaya, Bluefields. Atwood 4115 (SEYM).

El Bluff. Marshall & Neill 6516 (BM, DUKE, ENAG, FLAS, GH, MO, NY, SEYM, SMU, UC).

Puerto Isabel. Narvaez 2886 (US);

Seymour 2946 (BM, DUKE, ENAG,

FLAS, GH, MO, NY, SEYM, SMU, UC).

7. Bacopa auriculata (Robinson) Greenman, Filed Col. Mus. Bot. series 2:262. 1907. Herpestis auriculata Robinson, Proc. Am. Acad. 26:172. 1891. Canal Zone. Standley, P. C. Fl. Panama Canal Zone. Contr. U. S. Nat. Herb. 27:336-37. 1928.

8. Bacopa salzmännii (Bth.) Edwall, Bot. Comm. Geogr. Sao Paulo 13:176, 181. 1897.

Mexico, Guatemala, Honduras (US), Nicaragua, Costa Rica, Panama (US) to Brazil; Fl. Guatemala 9:334. 1973.

Nicaragua: Dept. Zelaya, Comarca del Cabo, Waspan.

Seymour 4669 (SEYM).

Dept. Rio San Juan, San Juan del Norte.

Seymour 5312 (SEYM).

9. Bacopa violacea (Pennell) Standley, Journ. Wash. Acad. Sci. 15:460. 1925. Monocardia violacea Pennell, Proc. Phila. Acad. Sci. 72:156. 1920. Standley writes: "probably not distinct from B. Salzmanni"; Fl. Costa Rica 1102. 1938. Costa Rica. Nicaragua: Dept. Zelaya, Comarca del Cabo, Waspan. Atwood 3620 (SEYM).

10. Bacopa limosa (Pennell) Standley, Journ. Wash. Acad. Sci. 15:460. 1925. Macuillamia limosa Pennell, Proc. Phila. Acad. Sci. 72:158. 1920. Doubtfully distinct from Bacopa repens. Costa Rica (US).

11. Bacopa repens (Sw.) Wettstein in Engler & Prantl, Pflanzenfam. IV. 3b:76. 1891. Mexico (US), British Honduras, Panama (US), W. I., S. A.; Fl. Guatemala 9:334. 1973. Nicaragua: Dept. Zelaya, Puerto Cabezas. Molina 14779 (US). Puerto Isabel. Seymour 2929 (ENAG, GH, MO, SEYM, SMU).

12. Bacopa parviflora L. Wms., Fieldiana, Bot. 34:118. 1972. Honduras (US), Nicaragua, Panama; Fl. Guatemala 9:333. 1973.

13. Bacopa curtipes Standley & L. Wms., Ceiba 3:129. 1952. Honduras (US).

14. Bacopa naias Standley, Field Mus. Bot. 11:141. 1932. British Honduras; Fl. Guatemala 9:332. 1973.

Excluded species. Bacopa bracteolata (Pennell) Standley, Contr. U. S. Nat. Herb. 27:336. 1928. I have been unable to ascertain what Standley meant by this species. I cannot find the place where Pennell first published it. Dr. William C. Burger of the Field Museum has very kindly informed me that it is unknown there also. It is listed in Standley's Fl. Canal Zone, Contr. U. S. Nat. Herb. 27:336-37. 1928 as known in Panama only.

Bacopa rotundifolia (Mx.) Wettstein in Engler & Prantl, Pflanzenfam. 4. Abt. 3b:76. 1891. Monniera rotundifolia Mx., Fl. Bor. Am. 2:22. 1803, non Herpestis rotundifolia Gaertner f. This species has been reported in Mexico, Guatemala and Panama. However, Fl. Guat. 9:334. 1973, states that it is a "species of the United States. . . .". Therefore it is here considered not to occur in Central America.

### 23. TORENIA Linnaeus

Herbs. Leaves opposite. Flowers in racemes or axillary. Calyx tubular. Corolla cylindric, widened above, 2-lipped. Stamens 4. Capsule oblong.



- A. Calyx 1.5-2 cm long, widely winged; corolla about 3 cm long, purple and black-purple . . . 1. Torenia fournieri Fourn.  
 A. Calyx 6 mm long; corolla white . . . . . 2. Torenia thouarsii (C. & S.) Kuntze

1. Torenia fournieri Linden ex Fourn. in *Illustr. Hort.* 23: 129, t. 249. 1876. Honduras (US), Salvador (US), Nicaragua, Salas, 1966.

2. Torenia thouarsii (C. & S.) Kuntze, *Rev. Gen.* 468. 1891. Costa Rica (US).

24. MICRANTHEMUM Michaux

Herbs, prostrate, matted. Leaves opposite, entire. Flowers 1-2 in axils of leaves, almost sessile. Calyx 4-5-lobed or almost entire. Corolla 2-lipped, tube very short. Stamens 2. Capsule, in ours, globose.

- A. Leaves 4-9 mm wide, suborbicular . . . . . 1. Micranthemum umbrosum (Walter) Blake  
 A. Leaves 1.2-2.5 mm wide, oval to elliptic . . . . . 2. Micranthemum standleyi L. Wms.

1. Micranthemum umbrosum (Walter) Blake

Nicaragua: Dept. Rio San Juan, San Juan del Norte. Seymour 5311 (GH, MO, SEYM).

2. Micranthemum standleyi L. Wms., *Fieldiana, Bot.* 34: 124. 1972. Type: Guatemala: Dept. San Marcos, damp thickets near Ayutla. Standley 68810. Endemic.

25. LINDERNIA Allioni False Pimpernel

Herbs, glabrous or slightly hairy. Leaves opposite, entire or nearly so, not dotted or only slightly so. Flowers solitary in axils of leaves or upper ones in a raceme. Pedicels longer than calyx, longer or shorter than leaves. Calyx-lobes 5, nearly or quite equal, tube short or none. Corolla short, tubular, 2-lipped, white to bluish. Stamens 2 or 4. Capsule ovoid or short-oblong or subglobose.

- A. Leaves on short petioles; blades entire or crenate; calyx 2-4 mm long B.  
 B. Pedicels usually longer than leaves; capsule scarcely exceeding calyx . . 1. Lindernia crustacea (L.) F. Muell.  
 B. Pedicels very short; capsule about twice as long as calyx, 8-11 mm long . . . . . 2. Lindernia diffusa (L.) D. & J.

- A. Leaves sessile, entire or nearly so, rounded or somewhat clasping at base; plant glabrous or nearly so; blades 3-7-nerved C.
- C. Blades 4-10 mm long, usually longer than pedicels, rounded at tip, dotted; capsule subglobose . . . . .  
 . . . 3. Lindernia rotundifolia (L.) Standley & L. Wms.
- C. Blades 10-30 mm long, rounded or acute at tip, not dotted; capsule ovoid-oblong D.
- D. Lower pedicels shorter than leaves . . . . .  
 . . . . . 5. Lindernia dubia (L.) Pennell
- D. Lower and upper pedicels longer than leaves . . . . .  
 . . . . . 4. Lindernia anagallidea (Mx.) Pennell

1. Lindernia crustacea (L.) F. Muell., Syst. Cens. Austral. Pl. 97. 1882. Capraria crustacea L., Mant. Pl. 87. 1767. Torenia crustacea (L.) C. & S., Linnaea 2:570. 1827. Vandellia crustacea (L.) Bth., Scroph. Ind. 35. 1835. British Honduras (US), Guatemala (US), Honduras (US), Costa Rica (US), Panama, Old World tropics.

Nicaragua:

Dept. Zelaya, Comarca del Cabo, Waspan. Seymour 3590

(MO, SEYM).

Drenje de Rio Alaman. Shank & Molina 4858

(US).

Limbaika. Atwood 4889 (SEYM).

Dept. Chontales, Cuapa. Marshall & Neill 6674 (SEYM).

2. Lindernia diffusa (L.) Durand & Jackson, Index Kew. Suppl. 1:248. 1906. Vandellia diffusa L., Mant. Pl. 1:89. 1767. The long capsules (8-11 mm) readily distinguish this species from some others. S. Mexico, Guatemala (US), Honduras (US), Costa Rica (US), as Vandellia diffusa L.; Old World tropics.

Nicaragua:

Dept. Zelaya, Puerto Isabel. Seymour 2984 (VT).

Dept. Rio San Juan, Castillo. Atwood 5184 (ENAG, MO,

SEYM).

San Juan del Norte. Seymour 5312

(SEYM).

3. Lindernia rotundifolia (L.) Standley & L. Wms., Fieldiana, Bot. 34:122. 1972.

Guatemala, W. I., n. S. A., Old World tropics; Fl. Guatemala 9:374. 1973.

4. Lindernia anagallidea (Mx.) Pennell, Monogr. Acad. Sci. Phila. 1:152. 1935. Ilysanthes anagallidea (Mx.) Robinson, Rhodora 10:67. 1908.

United States, Mexico, British Honduras to Panama, W. I., S. A.; Fl. Guatemala 9:374. 1973.

5. Lindernia dubia (L.) Pennell, Monogr. Acad. Sci. Phila. 1:141. 1935. Ilysanthes dubia (L.) Barnhart, Bull. Torr. Bot. Club 26:376. 1899. S. Quebec to Ga., Gulf States, Mexico; Washington to California. Gray's Manual, ed. 8, 1279. 1950. See note, Fl. Guatemala 9:374. 1973.

Nicaragua: Dept. Zelaya, Rama. Proctor, Jones & Facey  
27425 (US).

Costa Rica: Boca San Carlos, across Rio San Juan from Nicaragua. Seymour 5226 (SEYM).

## 26. SIBTHORPIA Linnaeus

Herbs, prostrate, hairy. Leaves alternate, on petioles, orbicular-reniform, crenate or pinnatifid. Flowers axillary, solitary or clustered. Calyx 4-8-lobed, cup-shaped, lobes about equal. Corolla-tube short, lobes spreading, almost equal. Stamens as many as corolla-lobes or 1 fewer. Capsule compressed.

1. Sibthorpia repens (L.) Kuntze, Rev. Gen. Pl. 3:239. 1898. Sibthorpia pichinensis HBK., Nov. Gen. & Sp. Pl. 2: 390, t. 176. 1817. Blades crenate, not pinnatifid, mostly shorter than petioles, cordate. Central and s. Mexico, Salvador, Honduras, Costa Rica; Fl. Guatemala 9:403. 1973.

## 27. CAPRARIA Linnaeus

Herbs. Stem much branched, somewhat woody at base. Leaves alternate, toothed. Flowers axillary, on pedicels. Calyx-lobes 5, almost equal, almost distinct. Corolla-lobes equal. Stamens usually 5. Capsule notched at tip, somewhat compressed.

1. Capraria biflora L., Sp. Pl. 628. 1753. Goatweed  
Whole plant hairy or glabrous. Flowers 1-2 or several in an axil. Pedicels 1-2 cm long, longer than calyx, shorter than leaves. Corolla about 1 cm long. Sepals 4-6 mm long, ciliate, acute or acuminate. Capsule 4-6 mm long.

a. Plant glabrous . . . . . var. biflora  
a. Plant pilose throughout . . . . . var. pilosa Griseb.

Var. biflora. S. Florida (FLAS), Mexico (FLAS), British Honduras, W. I., S. A. Uncertain which variety is in Honduras, Salvador, Costa Rica and Panama.

Var. pilosa Griseb., Fl. Brit. W. I. 427. 1864. Forma hirta Loes., Bull. Herb. Boiss. II. 3:284. 1903. Due to difference in range, the hairy specimens are treated here as a variety

See Fl. Guatemala 9:343. 1973, where the hairy specimens are treated as a form. They occur in s. Florida, Guatemala and Nicaragua. Var. pilosa is represented in FLAS from the following also: Tobago, San Salvador Island, Tortola, British Virgin Islands and Venezuela.

Nicaragua:

- Dept. Chinandega, Amejya. Maxon, Harvey & Valentine 7118 (US).
- Dept. Matagalpa, Calabazas. Seymour 2598 (BM, ENAG, F, GH, MO, NY, SEYM, SMU, UC, WDP, WIS).  
Sejaco. Seymour 2542 (MO, SEYM).
- Dept. Boaco, Boaco. Seymour 5428 (ENAG, MO, NY, SEYM, UC),  
Camoapa. Seymour 3538 (F, SEYM).
- Dept. Leon, Nagarote. Seymour 2388 (VT).  
Quezalguaque. Baker 2114 (US).
- Dept. Managua, Managua. Bro. Artemio 54 (US).  
Maxon, Harvey & Valentine 7255 (US).
- Dept. Rivas, Belen. Seymour 1934 (VT).
- Without definite locality. Wright (US); Chaves 5 (US).

28. SCOPARIA Linnaeus

Herbs or shrubs. Leaves opposite or more than 2 at a node, with resinous dots (punctate). Flowers axillary, solitary or in pairs. Calyx 4-lobed. Corolla-lobes 4, spreading, almost equal. Stamens 4.

- A. Stem 10-15 cm tall; leaves at most 1.5 cm long, lower ones pinnatifid or toothed or almost entire; calyx 2.5 mm long . . . . . 1. Scoparia annua C. & S.
- A. Stem 50-100 cm tall; largest leaves 2-3 cm long, serrate, uppermost entire; calyx 1.5-2 mm long 2. Scoparia dulcis L.

1. Scoparia annua C. & S., Linnaea 6:375. 1831.  
Mexico (US), Guatemala (US), Honduras (US), Salvador (US).  
Nicaragua: Dept. Nueva Segovia, Ocotal. Seymour 861 (SEYM).

2. Scoparia dulcis L., Sp. Pl. 116. 1753.  
Mexico (US), British Honduras (US), Guatemala (US), Honduras (US), Salvador (US), Costa Rica (US), Panama (US).  
Nicaragua:

- Dept. Zelaya, Comarca del Cabo, Bihmona. Seymour 5742 (V,T),  
Corn Is. Atwood 4394 (GH, SEYM).
- El Bluff. Narvaez 634 (BM, ENAG, F, FLAS, GH, MO, NY, SEYM, SMU, UC, WDP, YU).
- Nueva Guinea. Nelson 5380 (BM, SEYM).

- Dept. Zelaya, Punta Masaya. Seymour 691 (GH, SEYM).  
 Rama. Atwood & Moore 484 (VT).  
 Dept. Boaco, Camoapa. Seymour 3492 (VT).  
 Dept. Managua, Managua. Maxon, Harvey & Valentine 7253  
 (US);  
 Dudey, Hamblett & Nichols 188 (F,  
 MO, SEYM).  
 Dept. Carazo, Casa Colorada. Maxon, Harvey & Valentine  
 7455 (US);  
 Seymour 565 (SEYM, UC).  
 Dept. Rio San Juan, Castillo. Nelson 5204 (FLAS), 5205  
 (DUKE).  
 Dept. Rivas, La Virgen. Narvaez 1206 (ENAG, NY, SEYM,  
 WDP).  
 San Juan del Sur. Narvaez 1256 (ENAG, SEYM,  
 SMU).  
 Without definite locality. Wright (US).

29. VERONICA Linnaeus Speedwell

Herbs. Leaves opposite, or upper ones alternate, sometimes reduced to bracts. Flowers terminal or axillary. Calyx 4-5-lobed. Corolla 4-5-lobed almost to base, lobes spreading. Stamens 2. Capsule compressed, usually notched.

- A. Flowers almost sessile; stems glandular-hairy . . . . .  
 . . . . . 3. Veronica peregrina L. var. xalapensis HBK.  
 A. Flowers on pedicels B.  
 B. Pedicels usually equaling or exceeding leaves . . . . .  
 . . . . . 5. Veronica polita Fries  
 B. Pedicels shorter than leaves or bracts C.  
 C. Flowers axillary; pedicels shorter than calyx; capsule ciliate on margin . . . . . 4. Veronica arvensis L.  
 C. Flowers in terminal, bracted racemes; pedicels equaling or longer than calyx; capsule puberulent at tip D.  
 D. Hairs of axis and pedicels spreading, viscid or gland-tipped; corolla 5-8 mm across; capsule 4-6 mm wide . . . . . 2. Veronica tenella All.  
 D. Hairs of axis and pedicels fine, incurved; corolla 2-4 mm across; capsule 3-4 mm wide . . . . .  
 . . . . . 1. Veronica serpyllifolia L.

1. Veronica serpyllifolia L., Sp. Pl. 12. 1753.  
 Costa Rica (US).

2. Veronica tenella All., Fl. Pedemont. 1:75. 1785.  
 N. No. Amer., southward through Mexico, Andes of S. A., Europe, Asia.

3. Veronica peregrina L., Sp. Pl. 14. 1753,  
var. xalapensis HBK., Nov. Gen. & Sp. 2:389. 1817.  
United States, Mexico (US), Guatemala (US), Panama (US).

4. Veronica arvensis L., Sp. Pl. 13. 1753.  
No. Amer., Guatemala (US), Costa Rica (US), Europe.

5. Veronica polita Fries, Novit. Fl. Suec. 63. 1819.  
United States, Mexico, Guatemala (US), Honduras (US), Costa  
Rica (FLAS, US), Europe, Asia.

30. DIGITALIS Linnaeus Foxglove

Herbs. Leaves alternate. Flowers in 1-sided racemes,  
turned downward. Calyx lobed almost to base, lobes 5. Corolla  
wide-tubular. Stamens 4.

1. Digitalis purpurea L., Sp. Pl. 621. 1753.  
Plant with short, spreading hairs. Leaves toothed or almost  
entire. Calyx longer than pedicels, lobes obtuse. Corolla 4-5  
cm long, usually purple. Costa Rica (US).

31. ESCOBEDIA Ruiz & Pavon

Herbs, simple or slightly branched. Leaves opposite, ses-  
sile, narrow. Flowers axillary, on pedicels. Calyx long-tub-  
ular, lobes 5, long. Corolla long-tubular. Capsule ellipsoid.

A. Calyx-teeth lance-linear, 10-18 mm long; peduncles 4-7 cm  
long; bractlets near middle of pedicel . . . . .  
. . . . . 3. Escobedia laevis C. & S.

A. Calyx-teeth widely triangular, 2-6 mm long; pedicels 2-6 cm  
long B.

B. Bractlets near middle of pedicel. C.

C. Blades 1 cm wide; linear to lanceolate . . . . .  
. . . . . 2. Escobedia guatemalensis Loesner

C. Blades, widest ones, 3.5 cm wide, 7-15 cm long, ob-  
long-lanceolate; calyx 2.5-4 cm long; corolla 10 cm  
long or longer 1. Escobedia grandiflora (L. f.) Kuntze

B. Bractlets near base of calyx D.

D. Veins not prominent beneath; calyx-tube 4-6 cm long;  
blades acute or obtuse . . . . .  
. . . . . 4. Escobedia longiflora Pennell

D. Veins very prominent beneath; calyx-tube 3-4 cm long;  
blades acute, oblong-ovate . . . . .  
. . . . . 5. Escobedia reticulata Pennell

1. Escobedia grandiflora (L. f.) Kuntze, Rev. Gen. 3, part  
2, 231. 1898. Costa Rica (FLAS, US).

2. Escobedia guatemalensis Loesner, Vehr. Bot. Ver. Brandenb. 53:83. 1912. Mexico, British Honduras, Guatemala (US).

3. Escobedia laevis C. & S., Linnaea 5:108. 1830. Mexico, British Honduras, Honduras; Fl. Guatemala 9:352. 1973.

4. Escobedia longiflora Pennell, Proc. Acad. Nat. Sci. Phila. 83:423. 1931. Mexico, Guatemala (US).

5. Escobedia reticulata Pennell, Proc. Acad. Nat. Sci. Phila. 83:420, pl. 37, f. 7. 1931. Costa Rica (US).

Excluded species, Escobedia macrocalyx L. Wms. Dr. Williams C. Burger of the Field Museum has very kindly informed me that this species was never published and that Williams had annotated as type a specimen which he had previously annotated as *E. guatemalensis* Loes.

### 32. MELASMA Berg

Herbs, hairy. Leaves opposite, usually dentate, blackened in drying. Flowers in axillary or terminal spikes or racemes. Calyx 5-lobed less than 1/2 way, cup-shaped. Corolla-tube cup-shaped, short-tubular. Stamens 4. Capsule almost globose.

1. Melasma physalodes (D. Don) Melchior, Notizbl. Bot. Gart. Berlin 15:122. 1940. Flowers in axillary racemes. Calyx at flowering time about 2 cm long; in fruit, papery-inflated. Corolla about 3.5 cm long, white. Capsule 1-1.5 cm long. Central and s. Mexico, Guatemala, Honduras; Fl. Guatemala 9: 379. 1973.

### 33. ALECTRA Thunberg

Herbs with hirsute stem. Leaves opposite, hirsute, sessile or subsessile, toothed. Flowers sessile, axillary, solitary. Calyx 5-lobed about 1/2 way. Corolla 5-lobed. Stamens 4. Capsule depressed-globose.

1. Alectra aspera (C. & S.) L. Wms., Fieldiana, Bot. 34: 118. 1972. Leaves 2-5 cm long. Calyx 6-8 mm long. Corolla yellow, shorter or slightly longer than calyx. Capsule shorter than calyx. British Honduras to Panama, and W. I. to Brazil. Nicaragua:  
Dept. Zelaya, Corn Is. Atwood 3737 (GH, MO, SEYM).

### 34. GERARDIA Linnaeus

Herbs, glabrous or hairy. Leaves usually opposite, linear, usually entire. Flowers axillary, solitary. Calyx cup-shaped, 5-toothed. Corolla wide-tubular, usually purple, 5-lobed. Sta-



mens 4. Capsule obtuse or barely acute.

- A. Pedicels 1.5-2 mm long; calyx 3 mm long; leaves 1-2.5 cm long . . . . . 3. Gerardia spiciflora Engelm.  
 A. Pedicels 1.5-5 cm long or longer; calyx 4-6 mm long B.  
 B. Stems usually glabrous; corollas 2-3 cm long . . . . .  
 . . . . . 2. Gerardia peduncularis Bth.  
 B. Stems with short spreading hairs; corollas 12-15 mm long  
 . . . . . 1. Gerardia hispidula Mart.

1. Gerardia hispidula Mart., Nov. Gen. & Sp. 3:13. 1829.  
 Mexico, British Honduras, Guatemala, Honduras (US).  
 Nicaragua; Fl. Guatemala 9:354. 1973.

2. Gerardia peduncularis Bth. in Hook. Comp. Bot. Mag. 1:  
 209. 1836.

Mexico, Guatemala (US). Nicaragua; Fl. Guatemala 9:356. 1973.

3. Gerardia spiciflora Engelm., Bost. Jour. Nat. Hist. 5:  
 227. 1845. Gerardia harperi (Pennell) Pennell, Scrophularia-  
 ceae of Eastern Temperate No. Amer. 441. 1935.

United States, Mexico, British Honduras, W. I.

Nicaragua: Dept. Zelaya, Comarca del Cabo, Bihmona.

Seymour 5743 (GH, MO, SEYM).

Waspan. Seymour 3700 (BM,

ENAG, GH, MO, SEYM, SMU).

Puerto Cabezas. Atwood 4452

(ENAG, GH, MO, SEYM, SMU).

Tamla. Robbins 5942 (SEYM).

### 35. BUCHNERA Linnaeus

Herbs, black when dry, hispid or scabrous or puberulent or  
 glabrous. Stem unbranched or slightly branched. Leaves alter-  
 nate or opposite, linear or filiform. Flowers sessile, solitary  
 in axils of upper leaves or bracts. Calyx tubular, 4-9 mm long  
 in ours, lobes shorter than tube. Corolla-tube cylindric. Stam-  
 ens 4. Capsule ovoid.

Reference: Philcox, D. Revision of the New World Species of  
Buchnera L. Kew Bull. 18:275-315. 1965.

A. Stem with white or rufous spreading hairs; calyx 7-9 mm  
 long B.

B. Calyx hispidulous on and between nerves; leaves 20-40  
 mm long; perennial . . . . . 3. Buchnera obliqua Bth.

B. Calyx scabrous on nerves, glabrous between; leaves 5-25  
 mm long; annual . . . . . 5. Buchnera pusilla HBK.

- A. Stem glabrous or slightly hairy especially near nodes and base C.
- C. Calyx completely glabrous; leaves 3-nerved, 0.5-2 mm wide, 0.8-2.8 cm long; corolla glabrous . . . . . 6. Buchnera weberbaueri Diels
- C. Calyx at least slightly hairy on or between nerves D.
- D. Corolla glabrous outside except slightly hairy where covered by calyx; calyx not reticulate between nerves, hairy on nerves only; leaves 1.5-2.5 mm wide, 3.5-6 cm long . . . . . 2. Buchnera longifolia HBK.
- D. Corolla hairy outside E.
- E. Calyx reticulate between nerves, spreading-hispid or glabrescent between nerves; leaves prominently 3-5-nerved beneath, 4.5-8.5 mm wide, 5-9 cm long . . . . . 4. Buchnera rosea HBK.
- E. Calyx not reticulate between nerves, hairy between nerves at least when young; leaves with obscure nerves, 3-13 mm wide, 3-6 cm long . . . . . 1. Buchnera floridana Gandoger

1. Buchnera floridana Gandoger, Bull. Soc. Bot. France 66: 217. 1919. SE United States, Mexico, British Honduras to Trinidad, W. I.

2. Buchnera longifolia HBK., Nov. Gen. & Sp. 2:340. 1818. Buchnera elongata Sw., Prod. Veg. Ind. Occ. 92. 1788, an earlier but illegitimate name. See Philcox, D. Kew Bull. 18: 300. 1965. For description, see also Sci. Survey of Porto Rico and the Virgin Islands 6:189. 1925. Canal Zone, Honduras, W. I., S. A.

3. Buchnera obliqua Bth. in DC. Prodr. 10:498. 1846. Arizona, Mexico, Guatemala, Ecuador.

4. Buchnera rosea HBK., Nov. Gen. & Sp. 2:342. 1818. Panama, S. A.

5. Buchnera pusilla HBK., Nov. Gen. & Sp. 2:340. 1818. S. Mexico (US), British Honduras (US), Guatemala (US), Honduras (US), Salvador (US), Costa Rica (FLAS, US), Panama (FLAS, US), nw. S. A.

Nicaragua:

- Dept. Zelaya, Comarca del Cabo, Bihmona. Seymour 5745  
(BM, SEYM, SMU).
- Bilwaskarma. Seymour 4717 (SEYM).
- Cororia Bush. Atwood 3736  
(BM, SEYM, SMU).
- Waspan. Atwood 3643 (VT).
- Puerto Cabezas. Atwood 4453 (DUKE);  
Nelson 4535a (VT);

Marshall & Neill 6578 (BM, ENAG, GH, MO,  
SEYM, SMU, UC).

Tamla. Robbins 5943 (VT).

Dept. Chontales, Acoyapa. Hamblett 1697 (VT); Narvaez 1715  
(ENAG, F, GH, MO, NY, SEYM, UC, WDP);  
Marshall & Neill 7073 (SEYM).

Santo Tomas. Seymour 2796 (VT);

Atwood & Neill 7036a (BM,  
GH, MO, SEYM, SMU),

6. Buchnera weberbaueri Diels in Engl., Bot. Jahrb. 37:430.  
1906. British Honduras, Panama to Peru, Venezuela, Trini-  
dad.

Excluded species: Buchnera palustris (Aublet) Sprengel, Syst.  
2:805. 1825. Reported in British Honduras and Panama, but  
Philcox, l. c. p. 282, maintains that it does not occur in Cen-  
tral America.

### 36. CASTILLEJA Linnaeus f.

Herbs, usually parasitic. Leaves alternate, many, lanceo-  
late or linear, entire or lobed. Flowers in terminal bracted  
spikes or racemes; bracts leaf-like, usually colored. Calyx  
cylindric. Corolla 2-lipped, tubular. Stamens 4.

A. Longest leaves 4-8 cm long, entire E.

B. Pedicels at least 5 mm long; stem without tubercles . . .  
. . . . . 1. Castilleja integrifolia L. f.

B. Pedicels none; stem at base covered with tubercles . . .  
. . . . . 2. Castilleja arvensis C. & S.

A. Longest leaves 1-3.5 cm long; plants mostly or all peren-  
nial C.

C. Leaves (lowest) narrowly lance-oblong, 2.5-5 mm wide,  
obtuse, entire or serrate or lobed; calyx 16-20 mm long  
. . . . . 3. Castilleja alorum St. & St.

C. Leaves and bracts linear, 1-3 mm wide D.

D. Calyx 20-25 mm long E.

E. Calyx and bracts copiously hairy; leaves entire;  
bracts gradually narrowed to acute tip . . . . .  
. . . . . 4. Castilleja tenuiflora Bth.

E. Calyx and bracts glabrous or nearly so; bracts usu-  
ally green, longer than leaves; pedicels not more  
than 3 mm long . . . 5. Castilleja tapeinoclada Loes.

D. Calyx 13-19 mm long F.

F. Stem and leaves glabrous or nearly so; calyx 13-16  
mm long; leaves lobed G.

- G. Stem tufted, unbranched above base, 1.5-2.5 dm tall; corolla 20-21 mm long . . . .11. Castilleja seibertii Pennell
- G. Stem branched, up to 2 m tall; corolla 30 mm long; bracts rounded at tip . . . . .6. Castilleja irazuensis Oersted
- F. Stem and leaves finely or densely hairy H.
- H. Leaves 2-2.5 cm long; bracts entire I.
- I. Stem widely branched, more than 2 dm tall; corolla 12 mm long; leaves 3-ribbed; lobes of blades less than 1/4 length of blade . . .7. Castilleja aurantiaca Pennell
- I. Stem slightly branched, 1-2 dm tall; corolla 20-21 mm long; leaves obscurely 3-ribbed; lobes of blade more than 1/4 length of blade 8. Castilleja bicolor Pennell
- H. Leaves 1-2 cm long; hairs reflexed or spreading; corolla 19-23 mm long J.
- J. Stem widely branched; pedicels 2-4 mm long; bracts entire . . . . . 9. Castilleja chiriquensis Pennell
- J. Stem slightly branched except more branched near summit; bracts lobed; corolla 20-23 mm long; lobes of leaves, if any, rounded at tip K.
- K. Calyx 12 mm long; pedicels 4-6 mm long; stem 3-6 dm tall . . . . . 10. Castilleja quirosii Standley
- K. Calyx 15-16 mm long; pedicels 2-5 mm long; stem 1.5-2.5 dm tall . . 11. Castilleja seibertii Pennell

1. Castilleja integrifolia L. f., Suppl. Pl. 293. 1781.

For description, see Fl. Guatemala 9:345. 1973.

a. Leaves entire . . . . . var. integrifolia

a. Leaves, at least some of them, dentate or pinnatisect . . . . .

. . . . . var. alpigena L. Wms.

Var. integrifolia. Mexico, Guatemala, Honduras, Salvador, Costa Rica (US).

Var. alpigena L. Wms., Field Mus. Bot. 34:119. 1972.

Guatemala (US).

2. Castilleja arvensis C. & S., Linnaea 5:103. 1830.

For description, see Fl. Guatemala 9:345. 1973 and Fl. Costa

Rica 1104-5. 1938. Castilleja communis Bth. in DC. Prodr.

10:529. 1846. Mexico, Guatemala, Honduras, Salvador (US),

Costa Rica (FLAS, US).

Nicaragua:

Dept. Madriz, Volcan Somoto. Williams & Molina 20238 (US).

Dept. Jinotega, Jinotega. Moore 2111 (MO, SEYM).

Dept. Matagalpa, Between Matagalpa and Jinotega. Williams, Molina & Williams 23332 (US).

Dept. Managua, El Crucero. Atwood & Neill 6765 (ENAG, GH, MO, SEYM, SMU).

Dept. Granada, Volcan Mombacho. Atwood A154 (MSC).

Dept. Granada, Niguumistomo [Niquinonomo], Baker 753 (US).

3. Castilleja alorum St. & St., Field Mus. Bot. 23:85. 1943.

For description, see Fl. Guatemala 9:344. 1973. Guatemala.

4. Castilleja tenuiflora Bth., Pl. Hartweg. 22. 1840.

For description, see Sanchez, O. S. La Flora del Valle de Mexico 362. 1969. Guatemala (US).

5. Castilleja seibertii Pennell, Ann. Mo. Bot. Gard. 27:339. 1940. See same for description.

6. Castilleja irazuensis Oersted, Vid. Meddel. Kjoeb. 27. 1853. For description, see Fl. Costa Rica 1104. 1938.

Costa Rica (FLAS), Panama. Photo (US).

7. Castilleja aurantiaca Pennell, Ann. Mo. Bot. Gard. 27:338. 1940. For description, see same. Panama.

8. Castilleja bicolor Pennell, Ann. Mo. Bot. Gard. 27:340. 1940. For description, see same. Panama (US).

9. Castilleja chiriquensis Pennell, Ann. Mo. Bot. Gard. 27:338. 1940. For description, see same.

Panama, Maxon 5307 (US).

10. Castilleja quirosii Standley, Fl. Costa Rica 1104-1105. 1938. For description, see same. Costa Rica.

11. Castilleja tapeinoclada Loesner, Bull. Herb. Boiss. II, 3:285. 1903. For description, see Fl. Guatemala 9:346. 1973. Guatemala (US).

### 37. PEDICULARIS Linnaeus

Herbs. Leaves alternate or more than 2 at a node, the upper smaller. Flowers in terminal spike or rarely raceme. Calyx tubular or cup-shaped, 2-5-toothed. Corolla 2-lipped, tubular. Stamens 4. Capsule compressed.

1. Pedicularis orizabae C. & S., Linnaea 5:103. 1830.

Central and s. Mexico, Guatemala; Fl. Guatemala 9:385. 1973.

### 38. LAMOUREUXIA Humboldt, Bonpland & Kunth

Reference in addition to those in Bibliography:

Ernst, Wallace R. Floral Morphology and Systematics of Lamourouxia. Smithsonian Contribution to Botany #6. 1972.

Herbs or shrub-like plants. Leaves opposite, entire or dentate or dissected. Flowers terminal, in racemes or panicles or spikes. Calyx-lobes 4, linear, slightly longer than cup-shaped tube. Corolla tubular, much longer than calyx, 2-lipped, red (in our species) or orange. Fertile stamens 2; sterile stamens (staminodia) 2, or all fertile. Capsule ovoid.

- A. Blades deeply divided pinnately; stem upright; branches ascending at acute angle; tips of inflorescence ascending . . . . . 7. Lamourouxia multifida HBK.
- A. Blades not divided B.
- B. Leaves sessile, heart-shaped and clasping at base . . . . . 5. Lamourouxia viscosa HBK.
- B. Leaves on a petiole except sometimes the uppermost C.
- C. Blades wide at base, heart-shaped or rounded or very obtuse at base D.
- D. Stem erect; blades heart-shaped at base, widely ovate, at most 3 times as long as wide; peduncles 2-8 mm long . . . 3. Lamourouxia macrantha M. & G.
- D. Stem climbing; blades not heart-shaped at base; calyx-lobes 7-15 mm long E.
- E. Calyx densely villosulous, lobes often dentate . . . . . 4. Lamourouxia dependens Bth.
- E. Calyx-lobes puberulent or glabrous, not dentate . . . . . 1. Lamourouxia xalapensis HBK.
- C. Blades tapering to base F.
- F. Calyx and leaves hairy; blades ovate, at most 25 mm long; calyx-lobes 2-5 mm long . . . . . 6. Lamourouxia gutierrezii Oersted
- F. Calyx and leaves glabrous or nearly so or puberulent; calyx-lobes 6-15 mm long; blades 1.5-5.5 cm long G.
- G. Pedicels 5-10 mm long; stamens 4; blades about 3 times as long as wide, 1-2 cm wide . . . . . 1. Lamourouxia xalapensis HBK.
- G. Pedicels 2-5 mm long; fertile stamens 2; sterile stamens 2 (staminodia) . . . . . 2. Lamourouxia longiflora Bth.
1. Lamourouxia xalapensis HBK., Nov. Gen. & Sp. 2:338. 1818. Lamourouxia stenoglossa Hunnewell & Smith, Contr. Gray Herb. 124:4, t. 1, figs. 11-12. 1939. Mexico (GH), Guatemala, as L. stenoglossa (GH).
2. Lamourouxia longiflora Bth., Pl. Hartweg. 22. 1839.
- a. Blades serrulate or crenate . . . . . var. lanceolata (Bth.) L. Wms.
- a. Blades entire b.
- b. Calyx-lobes linear-lanceolate . . . . . var. longiflora
- b. Calyx-lobes mostly triangular . . . . . var. integerrima (Donn. Smith) L. Wms.
- Var. integerrima (Donn. Smith) L. Wms., Fieldiana, Bot. 34: 121. 1972. Lamourouxia integerrima Donn. Smith, Bot. Gaz. 13:189. 1888. Guatemala (US).

Var. lanceolata (Bth.) L. Wms., Fieldiana, Bot. 34:121. 1972.  
*Lamourouxia lanceolata* Bth. in DC. Prodr. 10:542. 1846.

S. Mexico, Salvador, Costa Rica (GH, US), Guatemala (US).

Var. longiflora. S. Mexico; Fieldiana, Bot. 34:121. 1972.

3. Lamourouxia macrantha Martens & Galeotti, Bull. Acad. Sci. Bruxelles 12(2):32. 1845. Mexico (GH), Guatemala (GH).

4. Lamourouxia dependens Bth. in DC. Prodr. 10:539. 1846.  
 Type specimen: Skinner (K). *Lamourouxia montana* Hunnewell & L. B. Smith, Contr. Gray Herb. 124:4. 1939. Guatemala (GH).

5. Lamourouxia viscosa HBK., Nov. Gen. 2:ed. folio 272, ed. quarto 338. 1817. 1818.

Mexico, Guatemala, Salvador, Honduras, Costa Rica, Panama; Smithsonian Contr. to Botany #6. 1972.

Nicaragua:

Dept. Nueva Segovia, Dipilto. Neill 6406 (ENAG, MO, SEYM).

Dept. Esteli, 43 miles toward Managua from Nicaragua-Honduras boundary by Inter American Highway. Morley 743 (US).

Dept. Chinandega, near Jinotega. Standley 9873 (F).

Volcan El Viejo. Baker 100 (GH), 881 (US),  
 2171 (GH).

Dept. Leon, Momotombo. Smith 121 (GH, US).

Without definite locality. Photo of Oersted 22719 (GH, US).

6. Lamourouxia gutierrezii Oersted in Bentham & Oersted, Videns-kabelige Meddelelser fra den Naturhistoriske Forening i Kjøbenhavn for Aaret 1853. 29. "1854".

Costa Rica (GH), Panama (GH).

7. Lamourouxia multifida HBK., Nov. Gen. & Sp. 2:339. 1818. Mexico (GH, US), Guatemala (GH, US).

#### ABBREVIATIONS in addition to those in common use.

Bth., Bentham	R. & P., Ruiz & Pavon
C. & S., Chamisso & Schlecht- endal	R. & S., Roemer & Schultes S. A., South America
D. & J., Durand & Jackson	St. & St., Standley & Steyer- mark
GMS., Gaertner, Meyer & Schreber	SEYM, Herbarium of Frank C. Seymour
M. & G., Martens & Galeotti	
Mx., Michaux, Andre	WDP, Herbarium of St. Norbert College, West De Pere, Wis.
N. Amer., North America	
Rob., Robinson, Benjamin L.	W. I., West Indies



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